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Abstract. We have investigated the abundance of several chemical elements in two large stellar samples kinematically representative of the thin and the thick disks of the Galaxy. Chemical, kinematical and age data have been collected from high quality sources in the literature. Velocities (U,V,W) have been computed and used to select stars with the highest probability to belong to the thin disk and the thick disk respectively. Our results show that the two disks are chemically well separated. Both exhibit a decline of [α/Fe] with increasing [Fe/H]. A transition between the thin/thick disks stars is observed at 10 Gyr

A sample of 823 stars with abundances of several elements (Fe,O,Mg,Ti,Si, Na,Ni,Al) was compiled from several papers (Ref 1 to 10) after checking the lack significant differences between their results. The velocities (U,V,W) and orbital parameters were computed for 640 Hipparcos stars having $\frac{\sigma_\pi}{\pi}$<0.25, to make a large database combining kinematics and detailed abundances. Ages of 442 stars were retrieved from Nordström et al(2004).

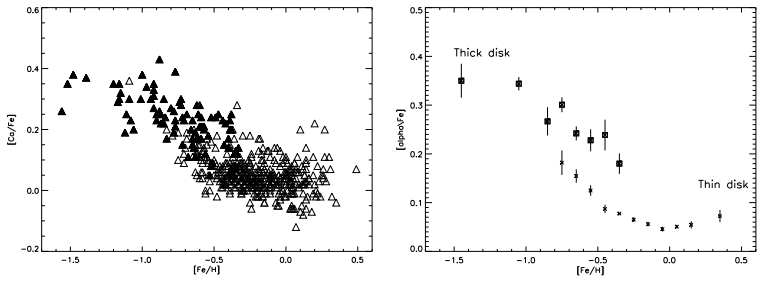

Fig. 1. Left : [Ca/Fe] vs [Fe/H] for the thin (empty triangles) and the thick (filled triangles) disk stars. Right : [α/Fe] vs [Fe/H].

In order to investigate the chemical and age properties of the thin and the thick disks separately we have performed the deconvolution of their velocitiy distributions. We show that about 25% of the sample has kinematics typical of the thick disk, adopting for its parameters $V_{lag} = -51 \mathrm{km\,s^{-1}}$ and $(\sigma_U, \sigma_V, \sigma_W) = (63, 39, 39)\,\mathrm{km\,s^{-1}}$. Stars having a probability higher than 80% to belong to the thin and thick disks were selected. Plots on Fig.1 show nicely the

separation between the thin and the thick disks. The thick disk is α-enhanced as compared to the thin disk but the decreasing trends are parallel. In the metallicity overlap, [α/Fe] of the thick disk exceeds by 0.08 dex that of the thin disk. No clear vertical gradient of abundance in the thick disk is seen on Fig.2. When only high precison ages (relative error $< 15\%$) are considered, a transition between ages of the thin and the thick disks stars at 10 Gyr is observed (Fig.2).

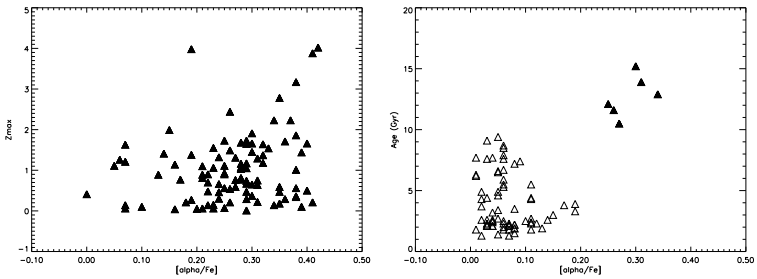

Fig. 2. Left : Zmax vs [α/Fe] for the thick disk stars. Right : Age distribution of the thin and thick disks stars.

Conclusion. Thanks to our large sample, the statistic is improved and the separation between the two disks is quantified. It is now clear that the thin and the thick disks are chemically well separated. We found a transition in the age distribution of the thin disk and the thick disk stars at 10 Gyr but no clear vertical gradient in the thick disk. These results constrain the formation scenarii of the Milky Way's disks.

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